

other policy, e.g., by way of non-limiting example, for assignment and unassignment of storage devices to the hosts. These software modules can reside on a common digital data processor platform, or can alternatively be distributed over a number of different platforms. Those platforms may comprise any digital data processor suitable for connectivity, e.g., with the hosts
5 12 (via the agents), as illustrated and otherwise for programming, configuration and/or operation in the role of a manager, as described below.

The illustrated manager 20 is connected to the hosts 12 and to the storage devices 14 via the LAN 18. A connection (not illustrated) to the storage devices can also be provided through the interconnect 16. As described in more detail below, the manager 20 communicates with a
10 plurality of agents, each of which resides on one of the hosts 12, to discover and gather information about the hosts, the interconnect fabric, and/or the storage devices. This can include inband discovery, i.e., utilization of the hosts (via the agents) to gather information regarding *inter alia* the storage devices and interconnect fabric via queries through the respective host bus
15 adapters (HBAs), or other respective interconnect 16 interfaces. It can also include outband discovery, e.g., utilization of the agents to gather host status/configuration information from the hosts themselves and/or to gather storage device status/configuration information from the storage devices themselves (e.g., using an SNMP protocol).

20 As shown in FIGURE 2, a SAN management environment according to the invention can include one or more consoles, such as consoles 22a and 22b, to present/accept information to/from an operator, such as a SAN administrator. Of course, other human machine interface (HMI) devices of the variety known in the art may be used in addition or instead (e.g., personal

digital assistants, teletype terminals, touch pads, and so forth). To this end, SAN manager 20 can utilize a graphical user interface (GUI) to drive information to the operator/administrator console and/or collect information therefrom. For example, the manager GUI can present a SAN topology on a console 22 and accept therefrom operator commands regarding host-to-storage
 5 device assignments or unassignment. Though reference is made throughout the specification to graphical user interfaces and GUIs, those skilled in the art will appreciate that this embraces non-graphical (e.g., textual or voice-synthesized) interfaces, where otherwise appropriate in view of context.

As discussed above, the manager 20 communicates with a plurality of agents, each of which is associated with one of the hosts 12, to gather information regarding attributes of the SAN. The manager 20 collates and utilizes this information to manage the SAN (e.g., *inter alia*, to discern the makeup, topology, and status of the SAN and its components, to apprise an administrator or other operator of the same and of changes thereto, and to implement an administrator-defined or
 5 other policy)

FIGURE 3 schematically depicts functional components of the manager 20 and an agent 24 in the illustrated embodiment of the invention. In particular, the manager 20 includes a policy manager module 26, a logical unit number (LUN) manager module 28, a SAN topology manager
 20 module 30, and a host manager module 32. In addition, the manager 20 includes a module 34 for providing kernel services, and a graphical user interface 36. The functionality of the modules can, of course, be divided differently.

Turning now to FIGURE 5, the services provided by the manager 20 can generally be grouped into Network management, LUN management, File System monitoring and extension and general services. An exemplary list of some of these services follows:

5 *SANDBParms.* Utility Service used for accessing database tables. Used by File Monitoring/Extension and LUN Management functions.

SANEvent. Utility Service that extends the TKS event service by providing logging and SNMP/TEC event forwarding.

SANEventCorrelatorFactory. Converts SNMP traps, reported by the Outband Change Agent, and HBA detected events, reported by the Inband Change Agents, into TSNM events. Also publishes the events.

5 *SANHostMgr.* Maintains the list of Managed Hosts by receiving information from the SANAgentHostQuery services.

SANIndex. Utility Service used to maintain indices for accessing information in database tables. This service is utilized in conjunction with SANDBParms, and is used by File
20 Monitoring/Extension and LUN Management functions.

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